

WHAT IS CLAIMED IS:

1. A semiconductor device having a driver circuit section and a pixel section on the same substrate, wherein:

a driver TFT of said driver circuit section, and a pixel TFT of said pixel section, each have a gate insulating film with a mutually differing film thickness; and

a film thickness of a dielectric of a storage capacitor formed in said pixel section is the same as a film thickness of the gate insulating film of said driver TFT.

2. A semiconductor device having a driver circuit section and a pixel section on the same substrate, wherein:

a film thickness of a gate insulating film of a driver TFT of said driver circuit section is thinner than the film thickness of a gate insulating film of a pixel TFT of said pixel section; and

a film thickness of a dielectric of a storage capacitor formed in said pixel section is the same as the film thickness of the gate insulating film of said driver TFT.

3. The semiconductor device according to Claim 1 or 2, wherein:

a film thickness of the gate insulating film of said pixel TFT is between 50 and 200 nm; and

a film thickness of the gate insulating film of said driver TFT is between 5 and 50 nm.

4. The semiconductor device according to Claim 1 or 2, wherein:

said storage capacitor includes an electrode from a

semiconductor film; and

an element selected from a group consisting of nickel, cobalt, palladium, germanium, platinum, iron, or copper is included in said electrode, at a concentration of  $1 \times 10^{19}$  atoms/cm<sup>3</sup> or greater.

5. The semiconductor device according to Claim 4, wherein a periodic table group 15 element is included in said electrode at a concentration of between  $5 \times 10^{18}$  and  $1 \times 10^{20}$  atoms/cm<sup>3</sup>.

6. Electric equipment wherein the semiconductor device according to any of Claims 1 to 5 is used as a display section.

7. A method of manufacturing a semiconductor device, comprising the steps of:

a step of forming an amorphous semiconductor film over a substrate;

a step of forming a crystalline semiconductor film, from said amorphous semiconductor film, by solid phase growth using an element selected from a group consisting of nickel, cobalt, palladium, germanium, platinum, iron, or copper;

a step of patterning said crystalline semiconductor film, forming an active layer;

a step of forming an insulating film on the surface of said active layer;

a step of oxidizing said active layer by thermal oxidation process after said step of forming an insulating film;

a step of doping a periodic table group 15 element or a periodic

table group 13 element into the active layer, which has passed through said step of oxidizing active layer; and

a step of performing heat treatment at a temperature of from 750 to 1150°C, after step of doping a periodic table group 15 element.

8. A method of manufacturing a semiconductor device comprising a driver TFT and a pixel TFT on the same substrate, comprising the steps of:

a step of forming an amorphous semiconductor film over a substrate;

a step of forming a crystalline semiconductor film, from said amorphous semiconductor film, by solid phase growth using an element selected from a group consisting of nickel, cobalt, palladium, germanium, platinum, iron, or copper;

a step of patterning said crystalline semiconductor film, forming an active layer of said driver TFT and an active layer of said pixel TFT;

a step of forming a first insulating film on the active layer of said driver TFT and on the active layer of said pixel TFT;

a step of etching said first insulating film, exposing the entire active layer of said driver TFT and a portion of the active layer of said pixel TFT;

a step of forming a second insulating film, on the surface of the active layer exposed by said fifth step, by thermal oxidation process;

a step of forming a wiring on the first insulating film and said second insulating film;

a step of doping a periodic table group 15 element or a periodic table group 13 element into the active layer using said wirings as a mask; and

a step of performing heat treatment at between 750 and 1150°C, after said step of doping a periodic table group 15 element.

9. A method of manufacturing a semiconductor device, comprising the steps of:

a step of forming an amorphous semiconductor film over a substrate;

a step of forming a crystalline semiconductor film, from said amorphous semiconductor film, by solid phase growth using an element selected from a group consisting of nickel, cobalt, palladium, germanium, platinum, iron, or copper;

a step of doping a periodic table group 15 element into said crystalline semiconductor film;

a step of performing heat treatment at between 500 and 650°C, after said step of doping a periodic table group 15 element;

a step of patterning the crystalline semiconductor film, which has passed through said step of performing heat treatment, forming an active layer;

a step of forming an insulating film on the surface of said active layer;

a step of oxidizing said active layer by thermal oxidation process, after said step of forming an insulating film;

a step of doping a periodic table group 15 element or a periodic table group 13 element into the active layer, after passing through said step of oxidizing said active layer; and

a step of performing heat treatment at a temperature of from 750 to 1150°C, after said step of doping a periodic table group 15 element or a periodic table group 13 element.

10. A method of manufacturing a semiconductor device including a driver TFT and a pixel TFT on the same substrate, comprising:

a step of forming an amorphous semiconductor film over a substrate;

a step of forming a crystalline semiconductor film, from said amorphous semiconductor film, by solid phase growth using an element selected from a group consisting of nickel, cobalt, palladium, germanium, platinum, iron, or copper;

a step of doping a periodic table group 15 element into said crystalline semiconductor film;

a step of performing heat treatment at between 500 and 650°C, after said step of doping a periodic table group 15 element;

a step of patterning the crystalline semiconductor film, which has passed through said fourth step, forming an active layer of said driver TFT and an active layer of said pixel TFT;

a step of forming a first insulating film on the active layer of said driver TFT and on the active layer of said pixel TFT;

a step of etching said first insulating film, exposing the entire active layer of said driver TFT and a portion of the active layer of said pixel TFT;

a step of forming a second insulating film, on the surface of the active layer exposed by said seventh step, by thermal oxidation process;

a step of forming a wiring on said first insulating film and said second insulating film;

a step of doping a periodic table group 15 element or a periodic table group 13 element into the active layer using said wirings as a mask; and

a step of performing heat treatment at between 750 and 1150°C, after said said step of doping a periodic table group 15 element or a periodic table group 13 element.

11. The method of manufacturing a semiconductor device according to any of Claims 7 to 10, wherein said thermal oxidation process is performed at a temperature of from 800 to 1150°C.

12. A method of manufacturing a semiconductor device having a driver circuit section and a pixel section on the same substrate, comprising the steps of:

a step of forming a semiconductor film over a substrate using an element selected from a group consisting of nickel, cobalt, palladium, germanium, platinum, iron, and copper;

a step of forming a gate insulating film on said semiconductor film;

a step of removing a portion of said gate insulating film, exposing a portion of an active layer;

a step of performing thermal oxidation process to form an oxidized film in the portion of the active layer exposed by said step of removing a portion of said gate insulating film;

a step of forming a gate wiring on said gate insulating film and on said oxidized film;

a step of forming a sidewall in a side face of said gate wiring;

a step of doping a periodic table group 15 element into said active layer using said gate wiring and said sidewall as a mask;

an step of removing said sidewall;

a step of doping a periodic table group 15 element into said active layer using said gate wiring as a mask;

a step of forming a resist mask on a region which becomes an NTFT later, and then doping a periodic table group 13 element; and

a step of performing heat treatment at the same temperature as in said fourth step, or at a higher temperature, moving a catalytic element into the region doped by said group 15 element in said step of doping a periodic table group 15 element into said active layer using said gate wiring and said sidewall as a mask.

13. A method of manufacturing a semiconductor device having a driver circuit section and a pixel section on the same substrate, comprising the steps of:

a step of forming a semiconductor film over a substrate using

an element selected from a group consisting of nickel, cobalt, palladium, germanium, platinum, iron, and copper;

a step of selectively doping a periodic table group 15 element into said semiconductor film;

a step of performing heat treatment to move a catalytic element into the region doped with said periodic table group 15 element;

a step of forming a gate insulating film on said semiconductor film;

a step of removing a portion of said gate insulating film, exposing a portion of an active layer;

a step of performing thermal oxidation process to form an oxidized film in the portion of the active layer exposed by said step of removing a portion of said gate insulating film;

a step of forming a gate wiring on said gate insulating film and on said oxidized film;

an step of forming a sidewall in a side face of said gate wiring;

a step of doping a periodic table group 15 element into said active layer using said gate wiring and said sidewall as a mask;

a step of removing said sidewall;

a step of doping a periodic table group 15 element into said active layer using said gate wiring as a mask; and

a step of forming a resist mask on a region which becomes an NTFT later, and then doping a periodic table group 13 element.

14. The method of manufacturing a semiconductor device



according to Claim 13, wherein at least a region which becomes a storage capacitor of said pixel section is included in the region doped by the periodic table group 15 element in said second step.

15. The method of manufacturing a semiconductor device according to Claim 13, wherein said step of performing heat treatment to move a catalytic element is performed at a temperature of from 500 to 650°C.

16. The method of manufacturing a semiconductor device according to Claim 12 or 13, wherein said thermal oxidation process is performed at a temperature of from 800 to 1150°C.

17. The method of manufacturing a semiconductor device according to Claim 12 or 13, wherein said sidewall is formed from a semiconductor film.